

DS-015

NVIDIA Jetson Orin Nano / Orin NX Compact AI Display Box

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Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

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 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! Warnings indicate conditions that if not observed can cause personal injury!



Les avertissements indiquent des conditions qui, si elles ne sont pas observées, peuvent causer des blessures!

Caution! Cautions are included to help prevent hardware damage and data losses. For example:



Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Des précautions sont incluses pour vous aider à éviter d'endommager le matériel ou à perdre des données. Par exemple:

Une pile neuve risque d'exploser si elle n'est pas installée correctement. N'essayez pas de recharger, d'ouvrir de force ou de chauffer la batterie. Remplacez la pile uniquement par le même type ou un type équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.

Note! Notes provide additional optional information.



Les notes fournissent des informations supplémentaires facultatives.

Warning! The equipment is not suitable for use in locations where children are likely to be present.



Cet équipement ne convient pas à une utilisation dans des lieux pouvant accueillir des enfants.

Caution! To avoid risk of electric shock, this equipment must only be connected to supply mains with protective earth.



Pour éviter tout risque d'électrocution, cet équipement ne doit être branché réseau d'alimentation avec une terre de protection.

Warning! *Restricted access area*



Area accessible only to skilled persons and instructed persons with the proper authorization.

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x DS-015
- 1 x 96PSA-A65W19V1-3 (19V power adapter)
- 1 x 1960057740T002 (Wall Mount brackets)
- 1 x SQF-C8MV2-128GDEDM (built-in 128G SSD and pre-installed OS)

Power Cord

Part Number	Description
1700001524	3-pin power cord (US)
170203183C	3-pin power cord (EU)
170203180A	3-pin power cord (UK)
1700008921	3-pin power cord with PSE (Japan)
1700019146	3-pin power cord with CCC (China)
1700018553	3-pin power cord (AU)
1700024849-01	3-pin power cord (TW)

Optional Items

Part Number	Description
1960056999T301	DS-015 VESA mount
EWM-W179M201E	802.11ax/ac/b/g/n M.2 2230 Key A/E solution based on RTL8852CE chipset (2T2R)
1751000648-01	RF Cable/ 1.13/ 10mm/ Black/ RP-SMA femal
1751000635-01	RF Cable/ 1.13/ 20mm/ Black/ RP-SMA femal
1751000460-01	WiFi 6E Dipole ANTENNA 2400~2500 / 5150~5850 / 5925~7125 MHz
96ICAM-301	GMSL camera
1700033535-01	M Cable USB-C 24P(M)/USB-A 4P(M) 10cm

Storage

Part Number	Description
SQF-C8MV2-128GDEDM	SQF M.2 2280 720-D 128G 3D TLC BiCS5 (-20~85° C)
SQF-C4MZ4-512GDEDE	SQF M.2 2242 720-D 512G 3D sTLC BiCS5 (40~85° C)

Ordering Information

Part Number	Description
DS-015VB-U0A1E	Orin Nano 4G
DS-015VB-U1A1E	Orin Nano 8G
DS-015VB-U0A1U	Orin Nano 4G, TW
DS-015VB-U1A1U	Orin Nano 8G, TW
DS-015VB-U2A1U	Orin NX 8G, TW
DS-015VB-U3A1U	Orin NX 16G, TW

DS-015 Series Part Number

DS-015VB-U0A1E	DS-015VB-U0A2E	DS-015VB-U0A3E	DS-015VB-U0A4E	DS-015VB-U0A5E
DS-015VB-U1A1E	DS-015VB-U1A2E	DS-015VB-U1A3E	DS-015VB-U1A4E	DS-015VB-U1A5E
DS-015VB-U2A1E	DS-015VB-U2A2E	DS-015VB-U2A3E	DS-015VB-U2A4E	DS-015VB-U2A5E
DS-015VB-U3A1E	DS-015VB-U3A2E	DS-015VB-U3A3E	DS-015VB-U3A4E	DS-015VB-U3A5E
DS-015VB-U4A1E	DS-015VB-U4A2E	DS-015VB-U4A3E	DS-015VB-U4A4E	DS-015VB-U4A5E
DS-015VB-U5A1E	DS-015VB-U5A2E	DS-015VB-U5A3E	DS-015VB-U5A4E	DS-015VB-U5A5E
DS-015VB-U6A1E	DS-015VB-U6A2E	DS-015VB-U6A3E	DS-015VB-U6A4E	DS-015VB-U6A5E
DS-015VB-U7A1E	DS-015VB-U7A2E	DS-015VB-U7A3E	DS-015VB-U7A4E	DS-015VB-U7A5E
DS-015VB-U8A1E	DS-015VB-U8A2E	DS-015VB-U8A3E	DS-015VB-U8A4E	DS-015VB-U8A5E
DS-015VB-U9A1E	DS-015VB-U9A2E	DS-015VB-U9A3E	DS-015VB-U9A4E	DS-015VB-U9A5E
DS-015VB-U0A1U	DS-015VB-U0A2U	DS-015VB-U0A3U	DS-015VB-U0A4U	DS-015VB-U0A5U
DS-015VB-U1A1U	DS-015VB-U1A2U	DS-015VB-U1A3U	DS-015VB-U1A4U	DS-015VB-U1A5U
DS-015VB-U2A1U	DS-015VB-U2A2U	DS-015VB-U2A3U	DS-015VB-U2A4U	DS-015VB-U2A5U
DS-015VB-U3A1U	DS-015VB-U3A2U	DS-015VB-U3A3U	DS-015VB-U3A4U	DS-015VB-U3A5U
DS-015VB-U4A1U	DS-015VB-U4A2U	DS-015VB-U4A3U	DS-015VB-U4A4U	DS-015VB-U4A5U
DS-015VB-U5A1U	DS-015VB-U5A2U	DS-015VB-U5A3U	DS-015VB-U5A4U	DS-015VB-U5A5U

DS-015VB-U6A1U	DS-015VB-U6A2U	DS-015VB-U6A3U	DS-015VB-U6A4U	DS-015VB-U6A5U
DS-015VB-U7A1U	DS-015VB-U7A2U	DS-015VB-U7A3U	DS-015VB-U7A4U	DS-015VB-U7A5U
DS-015VB-U8A1U	DS-015VB-U8A2U	DS-015VB-U8A3U	DS-015VB-U8A4U	DS-015VB-U8A5U
DS-015VB-U9A1U	DS-015VB-U9A2U	DS-015VB-U9A3U	DS-015VB-U9A4U	DS-015VB-U9A5U

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated the equipment.
 - The equipment has been exposed to moisture.
 - The equipment is malfunctioning, or does not operate according to the user manual.
 - The equipment has been dropped and damaged.
 - The equipment shows obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
Ne pas laisser cet équipement dans un environnement o la température de stockage pourrait être inférieure à -20°C (-4°F) ou supérieure à 60°C (140°F). Cela pourrait endommager l'équipement. L'équipement doit être dans un environnement contrôlé.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
Attention: Danger d'explosion en cas de remplacement incorrect de la batterie. Remplacez uniquement avec le même type ou le type équivalent recommandé par le fabricant, déposez les piles utilisées selon les instructions du fabricant.

-
17. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).
Le niveau de pression acoustique au poste de l'opérateur selon la norme CEI 704-1: 1982 n'est pas supérieur à 70 dB (A).
 18. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
ZONE D'ACCÈS RESTRICTED: L'équipement ne doit être installé que dans une zone d'accès restreint.
 19. DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.
AVERTISSEMENT: Cet ensemble d'instructions est donné conformément à la norme CEI 704-1. Advantech décline toute responsabilité quant à l'exactitude des déclarations contenues dans ce document.
 20. The product is intended to be supplied by an UL listed power supply suitable for use at minimum Tma 40 degree C whose output meets PS2(or LPS) and is rated: 19Vdc, 3.42A min. If need further assistance, please contact Advantech for further information.
Le produit doit être alimenté par une alimentation certifiée UL, adaptée à une utilisation à une température ambiante minimale (Tma) de 40 °C, dont la sortie répond aux exigences PS2 (ou LPS) et est spécifiée: 19 Vcc, 3,42 A minimum. Pour toute assistance supplémentaire, veuillez contacter Advantech pour plus d'informations.

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Chapter 1

General Information

This chapter gives background information of DS-015 series.

1.1 Introduction

The DS-015 is an ultra-slim Edge AI player powered by NVIDIA Jetson Orin Nano/ NX, delivering up to 100 TOPS INT8 performance for real-time computer vision and intelligent digital signage. With 4K HDMI output, dual GMSL camera inputs, rich USB and serial interfaces, and a smart fan design, it provides powerful AI acceleration in a compact form factor. Ideal for smart retail, smart city, and interactive display applications, the DS-015 integrates high performance, reliability, and flexible installation in one sleek solution.

1.2 Product Features

1.2.1 General

- Power by Nvidia 6-core Arm® Cortex-A78AE v8.2 64-bit.
- Multiple AI up to 157 TOPS (INT8)
- Ultra slim with smart fan design
- 3 x USB 3.2 Gen1, 1 x USB-C 2.0 for download mode only
- Display & Camera Support: HDMI 4K@60 output and GMSL camera interfaces

1.2.2 Display

- **HDMI:** HDMI 2.0 for NX
 - Nano: 4K UHD (3840×2160) @ 30Hz
 - NX: 4K UHD (3840×2160) @ 60Hz

1.2.3 Thermal Solution

- Smart Fan Design

1.3 Hardware & Software Specifications

- **Chipset:** NVIDIA Jetson Orin 4G/8G & NX 8G/16G
- **GPU:**
 - NVIDIA Jetson Orin Nano 4G: 512-cores NVIDIA Ampere Architecture with 16 Tensor Cores
 - NVIDIA Jetson Orin Nano 8G & NVIDIA Jetson Orin NX 8G/16G: 1024-cores NVIDIA Ampere Architecture with 32 Tensor Cores
- **System Memory:** Jetson Orin Nano 4GB / 8GB LPDDR5 4267 MT/s. Jetson Orin NX 8GB / 16GB LPDDR5 8533 MT/s
- **Storage:** M.2 2280 128G M Key
- **IO Interfaces:**
 - 1 x HDMI port
 - 3 x USB 3.2 x Gen1; 1 x USB type C for download mode only
 - 1 x RS232, 1 x RS-232/422/485.
 - 2 x LAN (by RJ-45)
 - 2 x FAKRA connectors for GMSL
 - Audio: 1 x Line-out; 1 x Mic-in
 - CAN Bus: CAN A/B (By jumper setting, shared with debug port)
 - SDHC: 1 x SD slot
- **Expansion:**

- M.2
 - 1 x M.2 M-Key 2280 (PCIe x 4)
 - 1 x M.2 M-Key 2242 (PCIe x 1)
 - 1 x M.2 E-Key 2230 (PCIe x1/USB 2.0)
- Storage
 - 1 x M.2 M-Key 2280 (built-in 128G SSD)
 - 1 x M.2 M-Key 2242
- **Ethernet Chipset:**
 - Controller:
 - 1G Realtek 8111
 - 2.5G Intel I226V
 - Interface: 2 x RJ45

1.4 Mechanical Specifications

1.4.1 Dimensions

180 x 177 x 29.9 mm

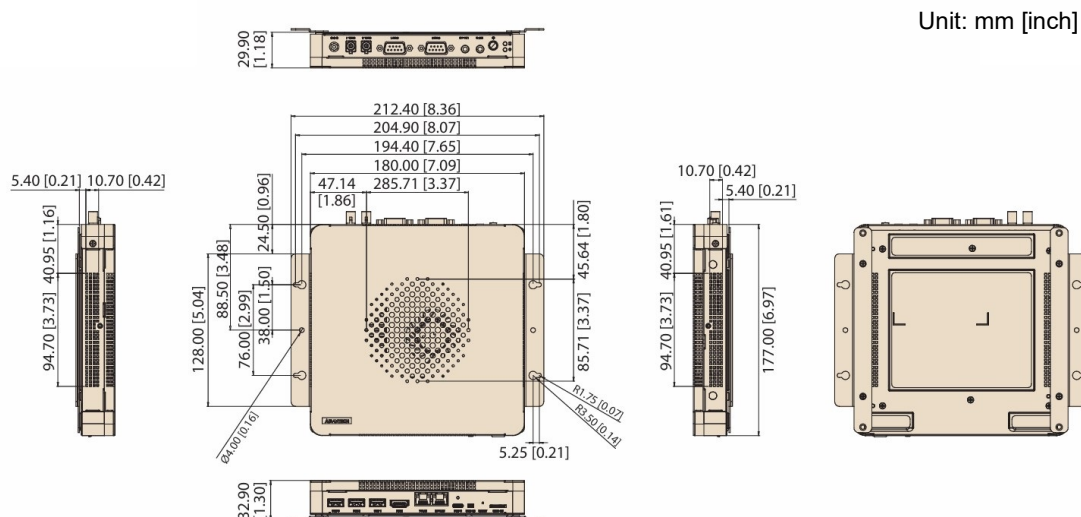


Figure 1.1 Dimensions

1.4.2 Weight

- 0.9 kg (Net weight)

1.5 Power Requirements

1.5.1 Power Consumption

- 12-24V

1.6 Environment Specifications

1.6.1 Operating Temperature

- 0 ~ 40 °C with 0.7m/s air flow or no airflow

1.6.2 Relative Humidity

- 95% @40 °C (non-condensing)

1.6.3 Storage Temperature

- -20 ~ 85 °C (-4 ~ 140 °F)

1.6.4 Vibration Loading During Operation

- 0.5 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 3 axes, 1 hr/axis.

1.6.5 Shock During Operation

- 20 G, IEC 60068-2-27, half sine, 11 ms duration

1.6.6 Safety

- UL, CB, BSMI

1.6.7 EMC

- CE, FCC Class B, BSMI, UKCA

Chapter 2

Hardware Installation

This chapter introduces external IO and the installation of DS-015 series Hardware.

2.1 DS-015 I/O

Front Side



Back Side



Figure 2.1 DS-015 I/O

2.1.1 Mic-in / Line-out

DS-015 Mic-in and Line-out can be connected with stereo speakers, or microphone by selecting from the audio application in the operating system.

- 1 × 3.5 mm Line-out (for headphones/speakers)
- 1 × 3.5 mm Mic-in (for external microphone)



MIC in Line out

Figure 2.2 Audio Connectors

2.1.2 LED

This LED indicator means power on status when it shows green.



Figure 2.3 LED-Power

This LED indicator means SSD status is active when it shows orange.



Figure 2.4 LED-SSD

2.1.3 Power On/Off

Push this button to power on/off DS-015.



Figure 2.5 Power Button

2.1.4 COM & CANBus Connector

DS-015 provides two D-sub 9-pin connector serial communication interface port. The port supports RS-232, RS-422, RS-485 communications. The communication protocol (RS-232, RS-485, or CAN Bus) is configurable via jumper settings.

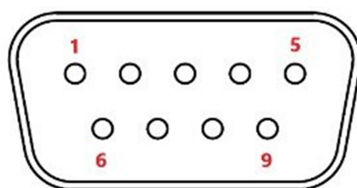


Figure 2.6 DB9 Connector

Table 2.1: COM1 Port Pin Assignments

Pin	RS-232	RS-485	RS-422
1	DCD	DATA-	TX-
2	RXD	DATA+	TX+
3	TXD	NC	RX+
4	DTR	NC	RX-
5	GND	NC	NC
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	NC	NC	NC

Table 2.2: COM2 Port Pin Assignments

Pin	DEBUG-RS-232	CANBUS
1	NC	NC
2	DEBUG-RXD	CAN-L
3	DEBUG-TXD	GND
4	NC	NC
5	GND	NC
6	NC	NC
7	NC	CAN-H
8	NC	NC
9	NC	NC

2.1.5 USB Connector

DS-015 provides three USB 3.2 Gen1.

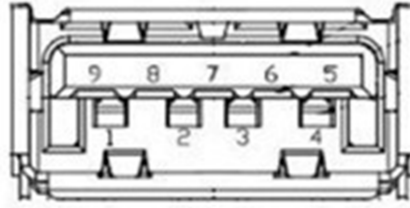


Figure 2.7 USB 3.2 Connector

Table 2.3: USB Port Pin Assignments

Pin	Signal
1	VCC
2	USB Data-
3	USB Data+
4	GND
5	SSRX-
6	SSRX+
7	GND
8	SSTX-
9	SSTX+

2.1.6 LAN Connector

The DS-015 is equipped with two Gigabit LAN ports compliant with IEEE 802.3u standards for 10/100/1000/2500Base-T CSMA/CD. Each Ethernet port uses a standard RJ-45 connector with built-in LEDs to indicate link/activity status and connection speed.

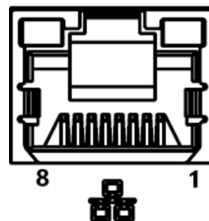


Figure 2.8 RJ-45 Connector

Table 2.4: LAN Port Pin Assignments

Pin	Signal
1	MDI1+
2	MDI1-
3	MDI2+
4	MDI3+
5	MDI3-
6	MDI2-
7	MDI4+
8	MDI4-

Table 2.5: LEDs**Right Side LED: Green LED**

Link Status	Always turn on without transmitting/receiving data Activity status
Activity Status	Flash

1G Left side LED: Green/Orange LED

Status	Display
10 Mbps	Always turn off
100 Mbps	Always turn off
1000 Mbps	Green

2.5 G Left side LED: Green/Orange LED

Status	Display
10 Mbps	Always turn off
100 Mbps	Always turn off
1000 Mbps	Orange
2500 Mbps	Green

2.1.7 Reset Button

This button resets the CPU, allowing the system to reboot in case of errors or to help resolve faults.

**Reset****Figure 2.9 Reset Button**

2.1.8 HDMI Port

The HDMI port deliver uncompressed, all-digital audio and video, are HDCP-compliant, and support connections to HDMI-compatible devices.

- HDMI: HDMI 1.4 for Nano & HDMI 2.0 for NX
 - Nano: 4K UHD (3840×2160) @ 30Hz
 - NX: 4K UHD (3840×2160) @ 60Hz

**Figure 2.10 HDMI Connector****Table 2.6: HDMI Pin Assignments**

Pin	Signal
1	TMDS Data 2+
2	TMDS Data 2 shield
3	TMDS Data 2-
4	TMDS Data 1+

Table 2.6: HDMI Pin Assignments

5	TMDS Data 1 shield
6	TMDS Data 1-
7	TMDS Data 0+
8	TMDS Data 0 shield
9	TTMDS Data 0-
10	TMDS Clock+
11	TMDS Clock shield
12	TMDS Clock-
13	CEC (Support by OEM/ODM)
14	Reserved
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5V

2.1.9 GMSL

DS-015 supports two GMSL cameras, using connectors designed for high-speed, low-latency, and noise-resistant multimedia transmission—ideal for automotive and industrial applications.



2.1.10 DLM-Dip: Flash Switch

Switch position to the right indicates ON, and to the left indicates OFF.

2.1.11 USB Type-C: Download Mode Only

The USB Type-C port is dedicated to download mode and is used for firmware flashing, system image installation, and device recovery. It does not support standard USB data or peripheral functions.

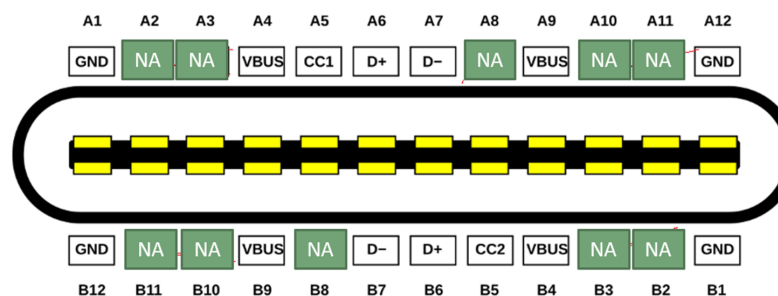


Table 2.7: USB Type-C Pin Assignments

A1	GND
A2	NA
A3	NA
A4	VBUS
A5	CC1
A6	D+
A7	D-
A8	NA
A9	VBUS
A10	NA
A11	NA
A12	GND
B1	GND
B2	NA
B3	NA
B4	VBUS
B5	CC2
B6	D+
B7	D-
B8	NA
B9	VBUS
B10	NA
B11	NA
B12	GND

2.1.12 SD Card

The DS-015 supports an SD card slot for storage expansion and data management. It is compatible with SD / SDHC / SDXC cards, enabling users to easily store, transfer, and back up data.

SD / SDHC / SDXC supported.

Read up to 164 MB/s, write up to 16.3 MB/s (internal test, 1 GB transfer).

Gold-plated contacts for reliable connection.



micro-SD

2.1.13 DLM-Clip

DLM-Clip (Boot & Download Mode Switch)

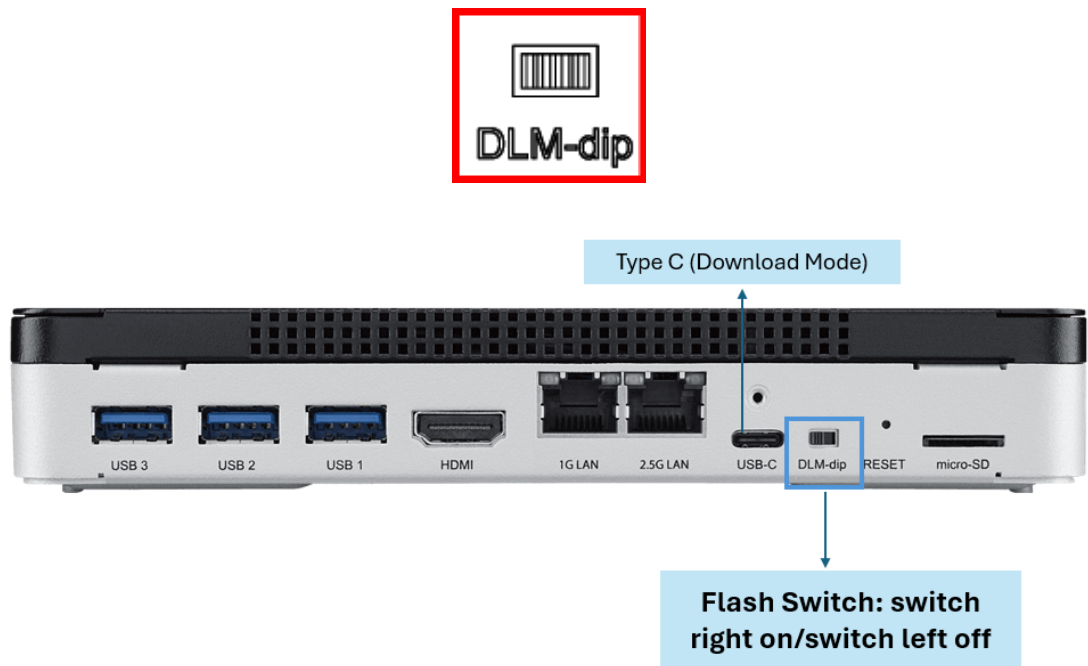
The DLM-Clip can be used to switch the system between boot mode (off) and download mode (on) for image flashing.

Download Mode:

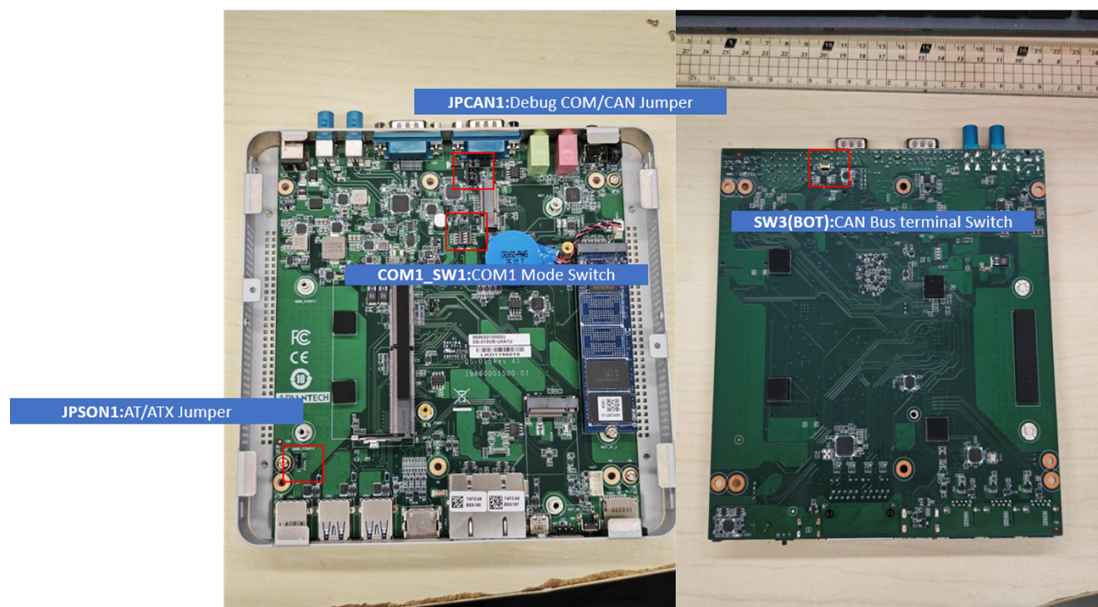
When the DLM-Clip is switched to download mode (on) position, the system will enter recovery mode, allowing users to flash the system image via the USB Type-C port.

Boot Mode:

When the DLM-Clip is switched back to the default position (off), the system will boot according to the standard boot sequence.



2.2 Switch



2.2.1 Jumper

2.2.1.1 AT/ATX Mode Jumper

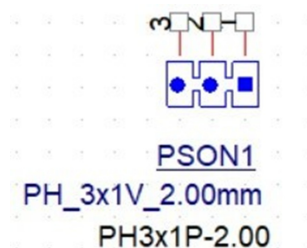


Table 2.8: AT/ATX Mode Jumper

Location	JPSON1
Part Number	1653003101
Foot Print	PH3X1V-2.0mm
Description	PIN HEADER 3x1P2.0mm 180D(M)DIP 2000-13WS
Setting	Function
(1-2)*	ATX (Default)
(2-3)	AT

2.2.1.2 Debug COM/CAN Bus Jumper

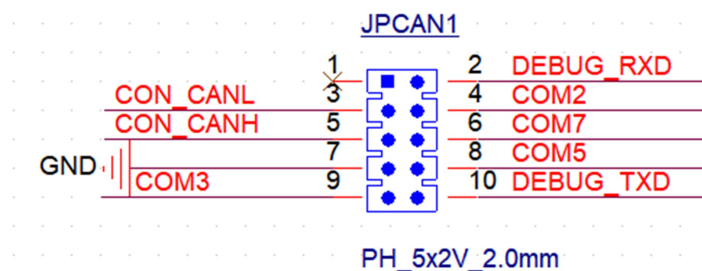


Table 2.9: Debug COM/CAN Bus Jumper

Location	JPCAN1
Part Number	1653005201
Foot Print	PH5X2V-2.0mm
Description	PIN HEADER 5x2P 2.0mm 180D(M) DIP 21N2205010S10
Setting	Function
3-4,5-6,7-9	CAN Bus
2-4,7-8,9-10	2 wire Debug COM (default)

2.2.1.3 CAN Bus Terminal Switch

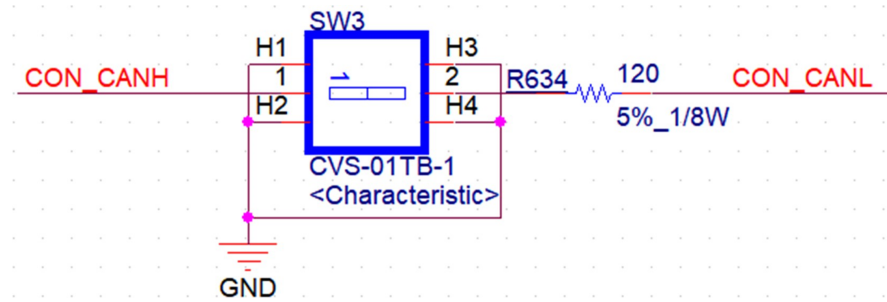


Table 2.10: CAN Bus Terminal Switch

Location	SW3
Part Number	1600004006-01
Foot Print	NA
Description	DIP SW SPSTx1/2P/-/VA/GFL/S/BK/H1.45
Setting	Function
ON	Termination resistors 120ohm (Default)
OFF	No termination resistors

2.2.2 COM1 Mode Switch

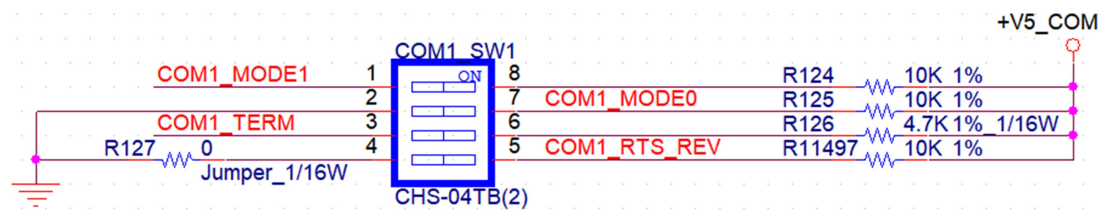


Table 2.11: COM1 Mode Switch

Location	COM1_SW1			
Part Number	1600000402-02			
Foot Print	NA			
Description	DIP SW SPSTx4/8P/1.27/VA/GFL/S/BK/H2.2			
Setting	Function			
SW1	SW2	SW3	SW4	Panel Functional
OFF	OFF	OFF	OFF	RS-232 (default)
ON	OFF	OFF	OFF	RS-422
ON	ON	OFF	ON	RS-485 with Software flow control
OFF	ON	OFF	OFF	Loop-Back

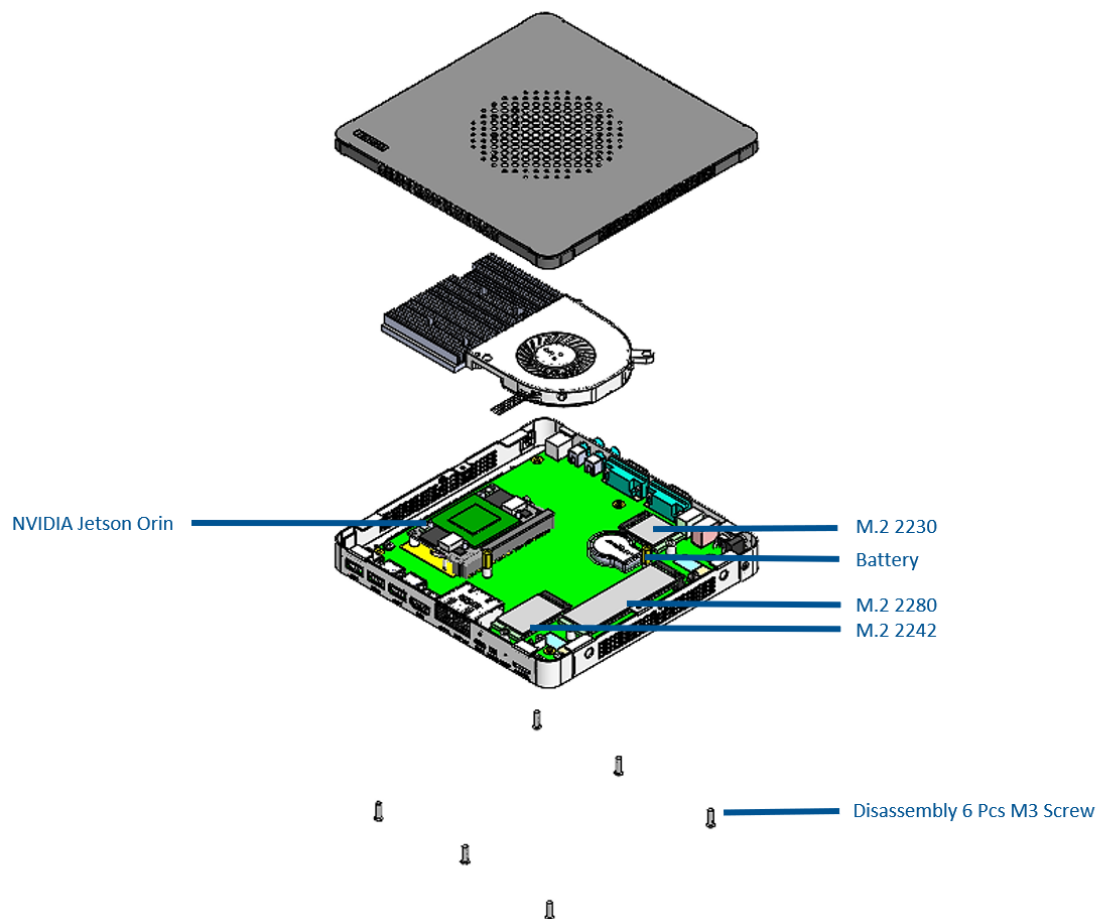
2.2.3 Other Jumpers

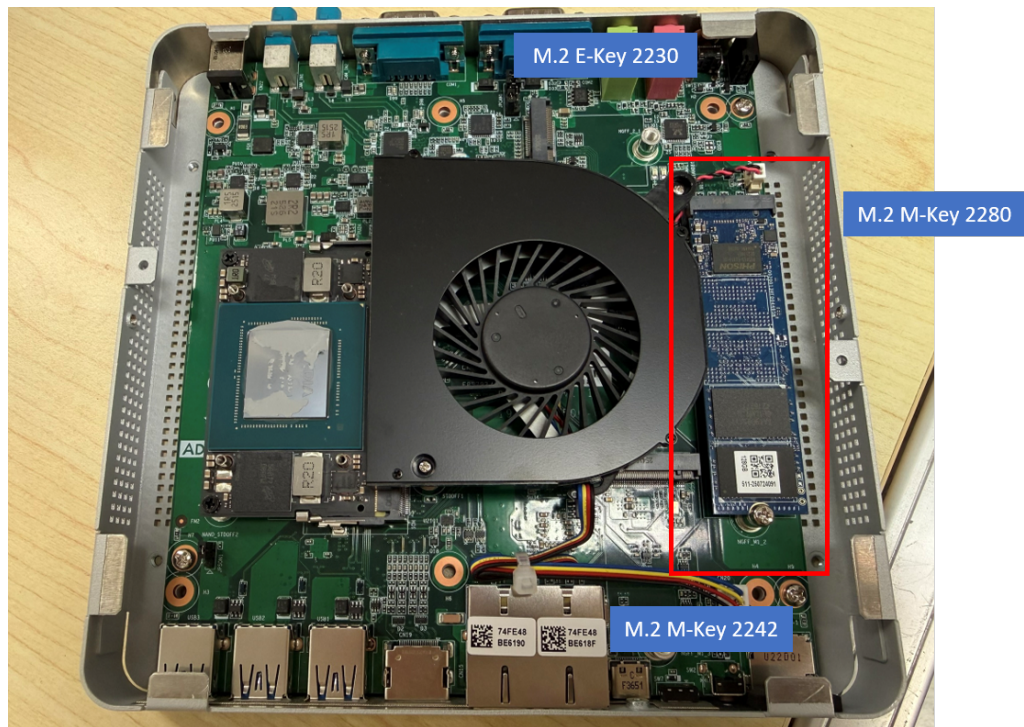
Other Jumpers in the PCB are reserved for circuit options and OEM support. Please keep it as default shipping status.

2.3 Installation

2.3.1 SSD Installation

1. Remove the 6 screws from the back cover.
2. Remove the top cover, install the M.2 2280 module, and secure it with a screw.

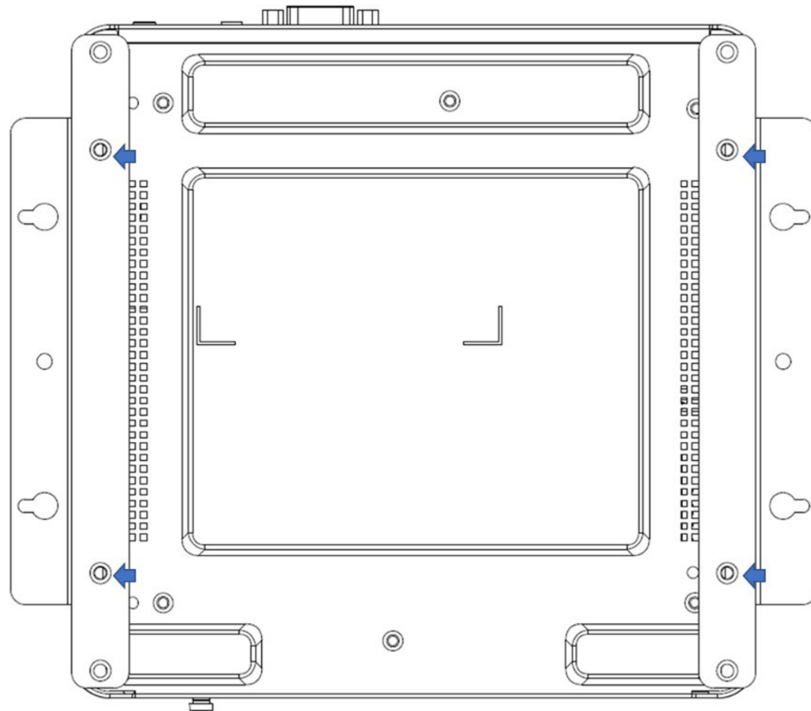




2.3.2 Wall Mount Installation

To install the system using the wall mount kit, secure it with four M3-4L (7 mm) screws, following the indicated arrow directions.

Lors de l'installation du système avec le kit de montage mural, veuillez visser les quatre vis M3-4L selon les indications des flèches.



Chapter 3

ARM-Base Device Firmware

3.1 DS-015 Firmware Introduction

The DS-015 firmware is designed to deliver a stable, high-performance software foundation optimized for edge AI, industrial automation, and multimedia applications. Built on the NVIDIA Jetson Orin platform, the firmware integrates essential system services, enhanced camera support, and customizable middleware to help users quickly deploy their AI workloads.

3.2 Device Part Numbers and Firmware

This table lists the corresponding part numbers with their supported operating systems. For detailed hardware configurations, please refer to the DS-015 datasheet.

Table 3.1: Device Part Numbers and Firmware

Part Number	OS	Version
DS-015VB-U0A1E	Linux Ubuntu	22.04
DS-015VB-U1A1E	Linux Ubuntu	22.04
DS-015VB-U0A1U	Linux Ubuntu	22.04
DS-015VB-U1A1U	Linux Ubuntu	22.04
DS-015VB-U2A1U	Linux Ubuntu	22.04
DS-015VB-U3A1U	Linux Ubuntu	22.04

3.3 Software Functionality

3.3.1 Start up

3.3.1.1 Account & Password

Account number

```
ubuntu
```

In device used "sudo" or "sudo su" to root. Password required.

```
ubuntu
```

3.3.1.2 CAN

Hardware Config Parts: Please refer to the chapter 2.2.2 and chapter 2.2.3.

<Receive> In terminal, run below command

```
$ sudo su
# modprobe can
# modprobe can-dev
# modprobe mttcan
# ip link set can0 type can bitrate 500000
# ip link set can0 up
# candump can0
```

<Transmit> In other device terminal, run below command

```
$ sudo su
# modprobe can
# modprobe can-dev
# modprobe mttcan
# ip link set can0 type can bitrate 500000
# ip link set can0 up
# cansend can0 123#abcdabcd
```

3.3.1.3 WatchDog

```
$ sudo su
# sync; sleep 2; sync; echo c > /proc/sysrq-trigger
```

3.3.1.4 Audio

Line-Out : Codec Mixer Controls

```
$ amixer -c APE cset name="I2S1 Mux" 0
$ amixer -c APE cset name="I2S2 Mux" "ADMAIF1"
$ amixer -c APE cset name="CVB-RT DAC MIXL INF1 Switch" "on"
$ amixer -c APE cset name="CVB-RT DAC MIXR INF1 Switch" "on"
$ amixer -c APE cset name="CVB-RT Stereo DAC MIXL DAC L1 Switch" "on"
$ amixer -c APE cset name="CVB-RT Stereo DAC MIXR DAC R1 Switch" "on"
$ amixer -c APE cset name="CVB-RT DAC1 Playback Volume" "175,175"
$ amixer -c APE cset name="CVB-RT LOUT MIX DAC L1 Switch" "on"
$ amixer -c APE cset name="CVB-RT LOUT MIX DAC R1 Switch" "on"
$ amixer -c APE cset name="CVB-RT OUT Playback Switch" "on,on"
$ amixer -c APE cset name="CVB-RT OUT Playback Volume" "31"
```

Line-Out

```
$ aplay -D hw:APE,0 <in_wav>
```

Mic-In: Codec Mixer Controls

```
$ amixer -c APE cset name="ADMAIF1 Mux" "I2S2"
$ amixer -c APE cset name="CVB-RT RECMIXL BST1 Switch" "on"
$ amixer -c APE cset name="CVB-RT RECMIXR BST2 Switch" "on"
$ amixer -c APE cset name="CVB-RT IN1 Boost" 8
$ amixer -c APE cset name="CVB-RT IN2 Boost" 8
$ amixer -c APE cset name="CVB-RT Stereo ADC1 Mux" "ADC"
$ amixer -c APE cset name="CVB-RT Stereo ADC MIXL ADC1 Switch" "on"
$ amixer -c APE cset name="CVB-RT Stereo ADC MIXR ADC1 Switch" "on"
```

Mic-In

```
$ arecord -D hw:APE,0 -r 44100 -c 2 -f S16_LE output.wav
```

3.3.1.5 TPM

Pre-install TPM-tools

```
$ sudo apt install --yes tpm2-tools
```

(1) Generate random code

```
$ sudo su
root@linux:/home/ubuntu# tpm2_getrandom --hex 20
```

(2) Encrypt the specified file msg.dat

```
root@linux:/home/ubuntu# tpm2_createprimary -C p -c platform_primary.ctx
root@linux:/home/ubuntu# tpm2_create -C platform_primary.ctx -G
rsa2048 -u key.pub -r key.priv
root@linux:/home/ubuntu# tpm2_load -C platform_primary.ctx -u key.pub
-r key.priv -c key.ctx
root@linux:/home/ubuntu# echo "my test" >msg.dat
root@linux:/home/ubuntu# tpm2_rsaencrypt -c key.ctx -o msg.enc
msg.dat
root@linux:/home/ubuntu# cat msg.enc
root@linux:/home/ubuntu# tpm2_rsadecrypt -c key.ctx -o msg.ptext
msg.enc
root@linux:/home/ubuntu# cat msg.ptext
root@linux:/home/ubuntu# cat msg.dat
```

(3) Save data in the tpm memory

```
root@linux:/home/ubuntu# tpm2_nvdefine -Q 0x1500031 -C o -s 32 -a
"ownerread|policywrite|ownerwrite"
root@linux:/home/ubuntu# echo "write_tpm_adv" > adv.data
root@linux:/home/ubuntu# tpm2_nvwrite -Q 0x1500031 -C o -i adv.data
root@linux:/home/ubuntu# tpm2_nvread -Q 0x1500031 -C o -s 32 -o
read.data
root@linux:/home/ubuntu# cat read.data
```

(4) Confirm that the data has been written to the storage area.

```
root@linux:/home/ubuntu# tpm2_nvreadpublic > nv.out
root@linux:/home/ubuntu# cat nv.out
```

3.3.1.6 RTC

1. Please remove all internet.

```
$ sudo su
# date 010610452023 && hwclock -w && date
# date 010100002000 && hwclock -r && date
# hwclock -s && date
# reboot
$ sudo su
# hwclock -s && date
```

3.3.1.7 UART

Orin-Nano COM1: ttyTHS1

Switch to 232, 422, 485

Select the mode and refer to the table

RS-232

```
$ sudo su
# stty -F /dev/ttyTHS1 speed 115200 raw -echo
# cat /dev/ttyTHS1 &
# echo "1234" > /dev/ttyTHS1
```

RS-422

<Receive> In terminal, run below command

```
$ sudo su
# stty -F /dev/ttyTHS1 speed 115200
# cat /dev/ttyTHS1 &
# echo "1234" > /dev/ttyTHS1
```

<Transmit> In other device terminal, run below command

```
$ sudo su
# stty -F /dev/ttyTHS1 speed 115200
# cat /dev/ttyTHS1 &
# echo "1234" > /dev/ttyTHS1
```

RS-485

<Receive> In terminal, run below command

```
$ sudo su
# stty -F /dev/ttyTHS1 speed 115200 raw -echo
# cat /dev/ttyTHS1 &
# echo "1234" > /dev/ttyTHS1
```

<Transmit> In other device terminal, run below command

```
$ sudo su
# stty -F /dev/ttyTHS1 speed 115200 raw -echo
# cat /dev/ttyTHS1 &
# echo "1234" > /dev/ttyTHS1
<Flow control>

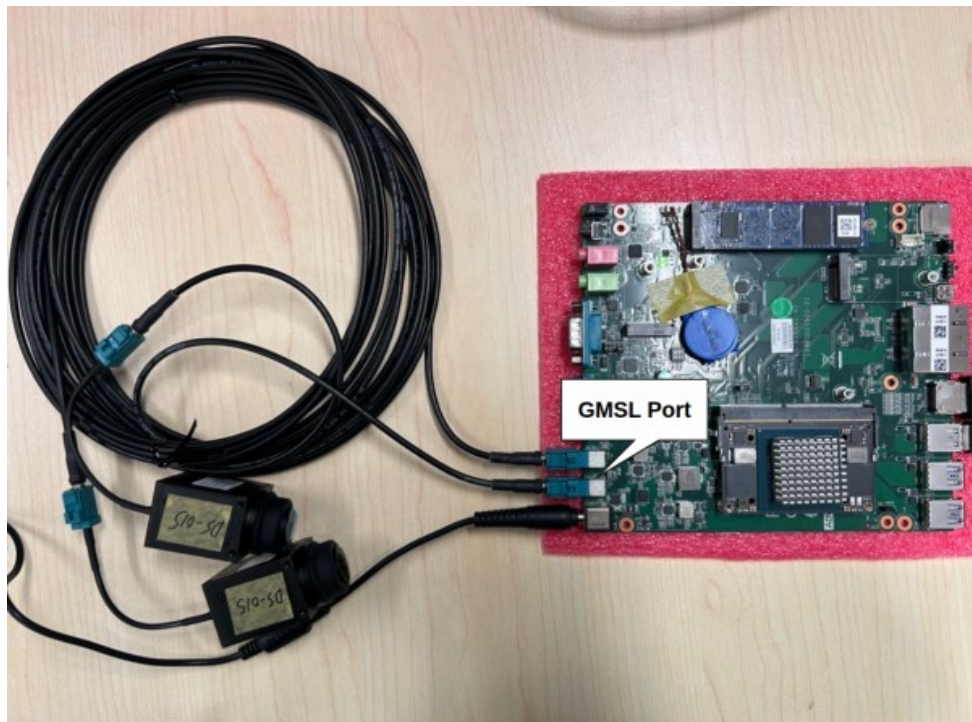
gpiochip0 112
command: gpioset --mode=wait gpiochip0 112=1
```

3.3.1.8 GMSL

APPROPHO Camera

Camera type: AR0822

HW setting: Camera link to GMSL port



Please install camera driver first

Note: This command can only be executed once to set up the camera.

Then system will reboot

```
$ cd /usr/local/bin/approcam  
$ sudo ./set_approcam.sh
```

Check Video channel "video0" "video1"

```
$ ls /dev/video*
```

Preview command

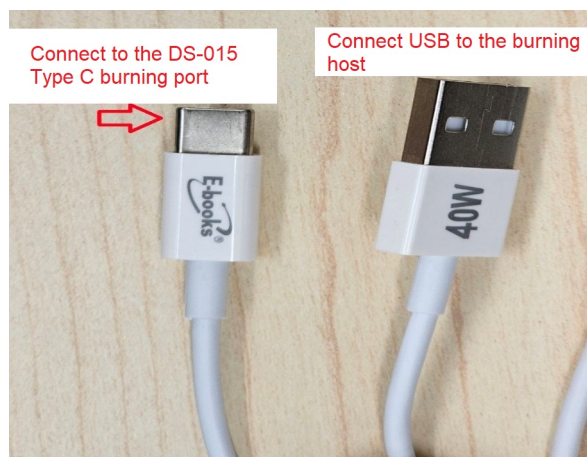
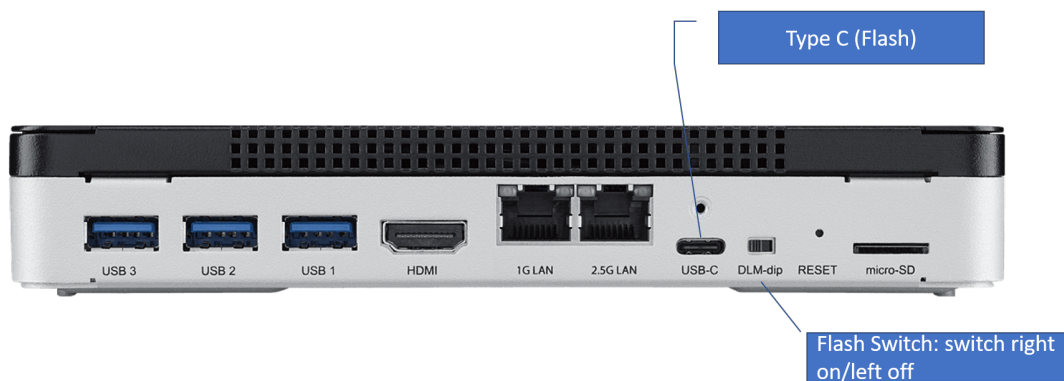
```
$ cd /home/ubuntu  
$ sudo ./enable-aprocamera-4k.sh
```

3.4 Software Functionality

Image refresh SOP

Before flashing the image, ensure the device is powered off. Set the switch to the **ON** position to enter flash mode, as shown in the figure.

If DLM-clip is in the **OFF** position, change it to **ON**, and then connect the Type-C cable (must support data transmission) to the flashing workstation.



Prepare a host PC with Ubuntu 22.04 installed.

Please ensure that the following packages are installed beforehand.

```
$sudo apt install libssl-dev
$sudo apt-get install sshpass
$sudo apt-get install abootimg
$sudo apt-get install nfs-kernel-server
$sudo apt-get install libxml2-utils
$sudo apt install make
$sudo apt-get install flex
$sudo apt-get install bison
$sudo apt-get install qemu-user-static
```

The following commands are executed on the flashing host to extract the image.tar.gz file (modify the file name according to the actual image).

```
$ sudo tar -zxvf image.tar.gz (Fill-in password:ubuntu)
$ cd Linux_for_Tegra
```

Flashing

— NVMe drive must be mounted.

```
$ sudo ./tools/kernel_flash/l4t_initrd_flash.sh --external-device
nvme0n1p1 -c tools/kernel_flash/flash_l4t_external.xml -p "-c boot-
loader/generic/cfg/flash_t234_qspi.xml" --showlogs
```



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